The Potential for Additional Channel Airlift in a Low Cargo Demand Theater

Graduate Research Project

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Abstract

This Graduate Research Project analyzed the feasibility of additional channel airlift throughout low cargo demand theaters specifically AFRICOM. Current operations in Afghanistan and the Middle East provide Air Mobility Command (AMC) ample flight hours to develop and season its mobility crew force. With a drawdown in operations and removal of the majority of US forces in Afghanistan AMC will have to find other areas in which to operate to ensure the global mobility proficiency of their aircrew. This paper evaluated the feasibility of using additional locations throughout Africa to provide AMC an option to train and develop its crew force, while providing airlift for a Geographic Combatant Command. This research analyzed the historic airlift demand in Africa. Airfields meeting channel demand requirements were then assessed for the viability of routine use. Finally, survey data from AMC C-5 and C-17squadron leadership were assessed to determine the desire for and potential training value added by operations in Africa. The results show there are additional locations in Africa that can support regular mobility lift, but AMC squadron leadership did not deem locations in Africa as optimal for future mobility development.

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Michael Pastuzyn

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I. Introduction

Background

Since combat operations began in 2001, there has been an insatiable need for mobility airlift. Over the past three fiscal years, sorties that landed in US Central Command accounted for 43% of C-17 and 19.5% of C-5 non training operations (Anderson, 2014). This need for mobility lift provided some large benefits to Air Mobility Command (AMC). First, the constant demand for cargo gave AMC a seemingly limitless customer base. This "blank check" for airlift nearly eliminated the need to fly AMC funded sorties for currency or force development. Additionally, wartime contingency operations provided a full time pressure cooker to season mobility aircrew and enhance the ability to operate in a dynamic global environment. With the termination of wartime operations in Iraq and the pending withdrawal of combat forces in Afghanistan, AMC is now facing a new paradigm in how to develop and train their mobility crew force. This opens the door for low cargo demand environments, which previously received minimal support.

Currently, AFRICOM's primary organic Air Force transportation assets are two EUCOM owned C130-J aircraft (Farmer, 2012). These aircraft represent a flexible, but limited source of lift. Additionally, opportune flight missions have shown to be an unreliable method for improving distribution because of the lack of planning capabilities. This creates reliance upon commercial contracts for which the true capability, flexibility, capacity, cost and performance is unknown. This research explores

supplementing/expanding routine cargo delivery through the AFRICOM area of responsibility (AOR) by pairing in theater need with AMC's requirement to train and season the mobility force. This symbiotic relationship will provide routine and reliable cargo delivery to the AFRICOM Theater while concurrently providing global experience to mobility aircrew.

Research Focus

The research focus consisted of a three phase analysis of the feasibility of using low cargo demand theaters, specifically AFRICOM, to season and trains the mobility crew force in a post war environment. This research focused on the current delivery structure and the historic cargo volume requirement as a demand signal in theater. The airfields requiring lift were then assessed against available airlift assets for suitability. This research examined the cargo demand of regular use airfields in Africa and compared that to the perceived training value these locations provide. The training value assessment came from a survey of current AMC C-5 and C-17 squadron leadership and determines where they think the most training value exists. The research results can be used by AMC leadership as a potential way to provide cargo support while training and sustaining the mobility force in a post war environment.

Research Question

The goal of this research is to analyze low cargo demand locations within the AFRICOM Theater and determine the feasibility of providing additional channel lift in theater while additionally using these locations to train/season the mobility crew force in

a post war environment. In order to make this determination, three key areas were assessed:

Demand:

1. What is the reoccurring demand at these low cargo density locations?
2. What is the average cargo demand in these locations?
3. What is the current delivery frequency, and is there flexibility or storage capacity?

Feasibility:

4. What assets does the Air Force have that can operate regularly out of the demand locations?
5. What local support exists at the delivery locations that are capable of handling Air Force aircraft (fuel, servicing, maintenance, and RON capability)?

Training Value Added:

6. What distance does it become cost prohibitive to get AMC assets to a low demand airfield?
7. What is the assessment of AMC squadron leadership for more training in the AFRICOM theater?

The nature of this research is relatively broad and requires a shift in thinking from the current paradigm. First, we have to accept that in a post war environment AMC will still require a certain number of flight hours to train its crew force and that these hours will have to be flown with partially loaded aircraft. Second, the cost of positioning aircraft to provide cargo support may have to be accepted or divested over multiple users for the long term value of mobility crew seasoning. Finally, there will need to be some

type of quantitative value placed on aircrew maintaining currency and honing operational capability so it does not appear that we are spending extremely large amounts of flight hours for relatively small amounts of cargo delivery.

Theoretical Lens

The theory of supply and demand, and training value added applies to this research. To apply these theories there needs to be at a minimum a certain level of demand in the area of investigation. The formula that must always be applied is, does the value added in cargo delivery, training and development exceed the cost of flight hours expended? Specifically, is this endeavor value added or cost prohibitive? The key comparison will be flight hours required to provide lift vs. training value gained from flying to these low demand locations. For comparison purposes the research will exclude any types of contingency operations where a "succeed at any cost" is pre-determined.

Methodology

The analysis focused on the factors of need, feasibility, and cargo delivered vs. training value. Different types of data analysis were used for each factor. First, route structure and cargo demand were analyzed. AMC/A9 and AFRICOM provided the data and it will set a baseline for current need and delivery methods. Second, feasibility was assessed by comparing the locations that have an acceptable requirement to the AMC assets that can operate in and out of those locations. Data such as airfield assessments, runway condition, enroute support, and instrument/radar support were used to assess what type of aircraft could be tasked against these missions. Next, this research assessed the survey data from AMC C-5 and C-17 squadron leadership and examined where they

think the future training focus should be centered. This research qualitatively and quantitatively assessed the value of additional AFRICOM flight routes. In the end, these data points were combined to formulate a recommendation on the feasibility and benefit of providing additional channel airlift in the AFRICOM Theater.

Assumptions/Limitations

The research problem has many variables, so the following assumptions were made to place this research into an achievable scope. The most significant assumption is that the withdrawal from Afghanistan will remain on track for the end of 2014. As operations in Afghanistan decrease the requirements for sustained high demand lift in the CENTCOM area of responsibility will significantly decrease. This reduction in customer requested/funded airlift will generate the need for AMC to find other avenues to provide the crew force global mobility experience. The second key assumption is that the hours required to develop/sustain the mobility force will be flown. In short there will continue to be a requirement to maintain proficiency in global mobility operations even if there is not a specific customer/cargo requirement. Third, AMC has the ability and support structure required to work in the aforementioned low demand cargo environment. In the current fiscal environment the DoD will not have the financial resources to develop infrastructure and improve airfield environments as we did in Afghanistan, these low demand routes will have to be relatively plug and play for the AMC fleet. Finally, AMC will not solely be looking at routes where the cargo delivered can offset the flying hour cost. It would be financially irresponsible for users to pay AMC higher rates than they could find with a commercial/contract carrier due to AMC's need to train aircrew. There

would have to be an established cost structure set where the user paid a competitive amount for their cargo and AMC shouldered the remainder of the financial burden as a "cost of development" for their mobility crew force. Now this is not to say that efforts would not be taken to maximize efficiencies, but there would have to be a realization that a portion of the flight hours bill would come from the Air Force training budget and not completely from user compensation for required lift.

Implications

This research provides recommendations as to whether additional route structure within the AFRICOM Theater is a feasible/valuable option for AMC in a post war environment. Additionally, this research provides AMC leadership with template to assess the feasibility of using low cargo demand locations as a method to develop the mobility crew force and maintain overseas currency in a post war environment. The three key factors that will be addressed are need, feasibility, and perceived training value added which are factored into the final recommendation for action. The scope of this research was not to define a specific route structure, but to assess options for the feasibility of mobility crew development using low cargo demand locations in a post war environment.

II. Literature Review

Chapter Overview

The objective of this chapter is to set the stage and provide the background required for this research project. The literature review focuses on five areas as the basis of the research questions and analysis. Areas examined were the training and development required to maintain proficient mobility aircrew specifically in the C-5 and C-17. Next, this review discusses the funding sources AMC uses to pay for the flight hours required to develop and maintain aircrew currency and proficiency. The third topic addressed is a brief review of the types of missions Air Mobility Command (AMC) uses to accomplish aircrew development. The literature review then addresses why an American mobility presence in Africa would not only fill a training gap for AMC but also help to strengthen the US position within the region. Finally, this review examines the current logistical footprint in Africa and discusses if AMC aircraft could add a critical logistical capability to United States Africa Command.

Need for Mobility Training and Development

Completing undergraduate pilot training (UPT) is the first of many steps in the development of US Air Force aviators. Following UPT the newly minted pilots must attend major weapons system (MWS) training at the respective formal training unit (FTU), and once complete they flow to their assigned unit and enter into mission qualification training. Mission qualification training requirements for AMC aircraft are outlined in volume 1 of the 11-2 series of publications. Once a pilot completes their

respective mission qualification the training focus switches to upgrade training and development.

Air Force Instruction (AFI) 11-2C-xx Volume 1 (V1) is the governing regulation for all aircrew training within a specific platform. According to AMC/A3TA the overall objective of the aircrew training and upgrade program is to develop and maintain a high state of readiness for the immediate and effective employment in exercises, peacekeeping operations, contingencies and war in any environment (AMC/A3TA, 2012). Additionally the mission of AMC stands to provide global air mobility... right effects, right place, right time (AMC, 2013). Statements such as these highlight the need for AMC operators not only to be familiar with their aircraft, but familiar with employing aircraft in the global environment.

Qualified vs. Experienced

Once an aircrew member successfully completes their Air Force check ride, they are qualified to operate in their respective aircraft. Qualification however does not directly translate to being operationally experienced or seasoned. This seasoning is accomplished by operating the aircraft in the local and global environment. According to AFI 11-102 AMC flying hour calculations must include an experiencing (aging) calculation (AF/A3O-AT, 2011). The regulation continues to state that copilots and wingmen must accumulate hours permitting them to upgrade at a minimal rate (AMC/A3TA, 2012).

This aging or seasoning calculation is currently handled by AMC/A3T. According to AMC/A3T there is no target sortie forecast for aircrew seasoning, only a

flying hour model based on force structure, authorized crew ratio and AFI 11-2C-xx V1 training requirements (AMC/A3T, 2013). The C-5 and C-17 V1 however do not use the term seasoning. The common term throughout these publications is experienced. The 11-2C-17V1 uses the term experienced associated with an aircrew members flying training level (FTL) which is assigned at the squadron level. A more concrete example of experienced is presented in the 11-2C-17V1 table 5.1. Assuming that only experienced pilots are allowed to upgrade to aircraft commander then the number of hours required to be an experienced C-17 pilot are 1,000 hours of flight time with 400 hours logged as primary in the C-17. The C-5 takes a slightly different approach. The FTLs in the C-5 are still assigned at the squadron level, but the 11-2C-5V1 offers years of operational experience as a general guideline. The experienced crewmember FTL in the C-5 is an aviator with between 5 and 10 years of operational experience. The C-5 uses similar upgrade criteria for upgrade to aircraft commander as the C-17. In the C-5 pilots upgrading need 1,000 hours of total flight time and 200 hours of primary C-5 flight time.

This flight hour requirement closely mimics what the Federal Aviation Administration requires for a rating as an Airline Transport Pilot (ATP). To receive an unrestricted airline transport pilot certificate a pilot must be 23 years of age and have 1,500 hours total flight time. Pilots with fewer than 1,500 flight hours may qualify for a restricted privileges airline transport pilot certificate beginning at 21 years of age if they are a military-trained pilot, have a bachelor's degree with an aviation major, or have an associate's degree with an aviation major (US Department of Transportation , 2013). The hour requirements addressed above divests the responsibility of aviation seasoning to the pilot requiring him or her to generate this experience outside the commercial airline

industry. The Air Force does not have this luxury and must generate its experience internally. This sentiment was echoed in an interview with then AMC Commander General Paul Selva. General Selva stated that "budget cuts have resulted in reduced flying hours and crew members are spending fewer and fewer hours in training" (Schogol, 2013).

Funding Development

To maintain aircrew currency and develop aviators AMC uses a combination of simulator events and flight hours. The allocation of these flight hours come from two primary classifications of funding. The Operational and Maintenance (O&M) category comes directly from the Air Force's budget and funds missions such as test and ferry, local training, Red Flag, and Weapons Instructor Course (WIC) support. This O&M funded training however represents a small portion of mobility aircrew development as depicted in Figure 1.

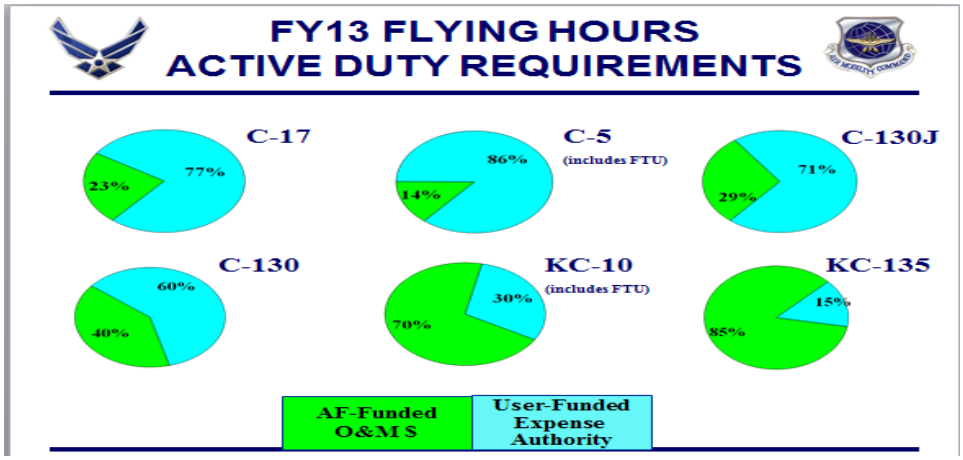


Figure 1. TWCF vs. O&M flying hour allotments (Widincamp & Vara, 2014)

The larger source of flight hours for the mobility force comes from the Transportation Working Capital Fund (TWCF). The US Transportation Command (USTRANSCOM) is the single manager of the TWCF and uses it to fund service providers such as Air Mobility Command (AMC), Military Surface Deployment and Distribution Command (SDDC), and Military Sealift Command (MSC) (Connor, et al., 2008). The TWCF is a revolving style fund where customers are sold transportation at predetermined rates and then pay the fund back for the service provided.

TWCF and AMC

Under the mission classes of channel passenger and channel cargo AMC charges customers according to the number of passengers and the weight of cargo volume. This charge is set at a 62% rate basis to remain commercially competitive. This recouped cost allows for the flight hours and aircrew currency items accomplished during these missions to be performed at a discount. Other mission classes such as Special Assignment Airlift Missions (SAAM), Joint Chiefs of Staff (JCS) directed exercises and Joint Airborne and Air Transportability Training (JA/AAT) AMC recovers 91% - 100% of the flight cost (Connor, et al., 2008). As Alan Bentley the Director of Program Analysis and Financial Management for USTRANSCOM put it "we get most of our transportation funding by selling services to our customers rather than by direct appropriation" (Bentley, 2009). This fact plays largely to AMC's benefit since USTRANSCOM takes a vested interest in selling airlift services to Department of Defense (DoD) customers giving AMC the opportunity to train and develop its crew force with non AMC dollars.

The value of mobility training and development provided by TWCF is not only seen by AMC. Building on USTRANSCOM's mission statement "USTRANSCOM provides full-spectrum global mobility solutions and related enabling capabilities for supported customers' requirements in peace and war" (USTRANSCOM, About US TRANSCOM, 2014) Mr. Bentley stated "USTRANSCOM is always focused on its operational readiness to perform its core missions, and in particular to globally project strategic national security capabilities" (Bentley, 2009). To project this capability through the air USTRANSCOM needs AMC to possess a force of qualified and experienced mobility aviators. Using mechanisms such as the TWCF spreads the aviation development cost over a large base of customers ensuring AMC will have the experience to flawlessly perform missions in peacetime and war.

Types of Missions

As previously discussed, the TWCF provides USTRANSCOM a mechanism for providing airlift to DoD customers. This airlift helps theater commanders meet their mission requirements while providing AMC aircrew currency and development opportunities. Like any good salesman USTRANSCOM via AMC has a variety of airlift services it can offer its customers.

Annex 3-17 Air Mobility Operations defines airlift as "operations to transport and deliver forces and materiel through the air in support of strategic, operational, or tactical objectives" (Curtise E. Lemay Center, 2013). Airlift can be further broken down into two broad categories inter-theater airlift which is operations between two or more geographic

combatant commands, and intra-theater airlift operations which are operations exclusively within one geographic combatant command (Curtise E. Lemay Center, 2013).

The airlift operations referenced take a geographic perspective on airlift, there is an additional set of classifications that describe the type airlift mission assigned. These mission types are derived from the type of lift authorized, the level of funding charged to the user, and the organization responsible for planning the mission. AMCI 11-208 lists thirteen distinct mission types. To remain within the confines of this research four mission types will be discussed Special Assignment Airlift Missions (SAAM), Channel, Contingencies, and Exercises (Air Mobility Command, 2000).

Special Assignment Airlift Mission (SAAM)

SAAMs are airlift missions operated to satisfy unique operational requirements for pickup and delivery at locations other than those established within the established channel structure (Curtise E. Lemay Center, 2013). Reasons for SAAM movements are specific user constraints, time requirement of delivery, geographic location of requirement, or special handling of passenger or cargo. SAAMs are prioritized through the DOD transportation movement priority system which will be addressed in detail later in this section.

SAAM missions are planned by either the Operating wing or HQ AMC TACC/XOO (Air Mobility Command, 2000). These missions are planned with specific user requirements in mind and offer the maximum level of flexibility to the customer.

Exercise and Contingency Support

Exercise and contingency missions involve deployment, sustainment, and redeployment via intertheater or intratheater airlift (Curtise E. Lemay Center, 2013).

These missions normally support a Geographic Combatant Commanders (GCC) operation plan (OPLAN) or an operation directed by the President, the Secretary of Defense (SECDEF), or the Joint Chiefs of Staff (JCS) with a specific logistical requirements.

Deployment and redeployment transportation requirements are planned using the joint operation planning and execution system. Supported commanders validate their inter-theater requirements to USTRANSCOM through the time-phased force and deployment data (TPFDD). The TPFDD details the CCDR's deployment and redeployment priorities that enable air mobility planners to build air movement plans (Curtise E. Lemay Center, 2013). HQ AMC TACC/XOP is the primary planning organization for contingency and exercise related missions (Air Mobility Command, 2000).

Channel

Channel missions are regularly scheduled taskings flown over fixed routes (Curtise E. Lemay Center, 2013). Per Defense Transportation Regulation 4500.9-R Appendix P channel missions are broken initially into two sub-categories: distribution or contingency. All channels by default will be considered common-user distribution channels unless they support on-going Joint Chiefs of Staff (JCS) approved contingency operations (US Transportation Command, 2011). Non contingency channels can serve intertheater or intratheater needs and provide the majority of airlifted sustainment (Curtise E. Lemay Center, 2013). The distribution channels will carry a 1B3 JCS priority, while all JCS approved contingency channels will have a 1B1 (US Transportation Command, 2011) .

An additional airlift option available to a supported combatant commander within the channel structure is called air mobility express (AMX). To establish this type of channel the supported combatant commander engages with the commander of USTRANSCOM to establish a special channel designed to move critically needed items rapidly to an AOR. The supported commander may apportion part of his or her CJCS-allocated lift on AMX by pallet positions to each component. To maximize effectiveness, the supported CCDR should establish a theater distribution system to deliver express cargo from aerial port of debarkation (APOD) to final destination (Curtise E. Lemay Center, 2013). Channel missions directed by USTRANSCOM and managed by AMC are planned by HQ AMC TACC/XOG (Air Mobility Command, 2000).

Mission Priority Classification

As discussed earlier in this section all cargo carried by air or sea has a priority assigned. To qualify for a priority code other than normal channel lift there needs to be a pre-validated level of urgency or circumstance (Chairman of the Joint Chiefs of Staff, 2014). The priorities are designated in alphanumeric fashion and will be discussed in descending order of precedence.

The highest priority classification is 1A. This classification is further broken into three subclasses 1A1, 1A2, and 1A3. The designator 1A1 is assigned to missions directly supporting the President, or missions in direct support of the National Airborne Operations Center (NAOC) when in direct support of the President. 1A2 missions support US and/or foreign forces or activities in combat with applicable Secretary of Defense (SECDEF) guidance. Finally, 1A3 missions are those approved by the President as top national priorities and include real world contingency deployment operations

supporting special forces, deployment of special category overseas law enforcement, deployment of humanitarian assistance and disaster relief (HA/DR), deployment of assets in support of homeland defense, special weapons, and movement of forces in support of national command and control (C2) capabilities (Chairman of the Joint Chiefs of Staff, 2014).

The next priority classification in order of precedence is 1B. 1B missions are again broken into three subcategories 1B1, 1B2, and 1B3. The 1B1 designation covers missions directed by the SECDEF including urgent contingency deployments, redeployment of forces conducting real world operations, routine law enforcement deployment missions, NAOC operations when not in support of the President, validated contingency channels, patients requiring urgent medical evacuation, and deployment of special operations forces for real world counterdrug and joint combined exchange training (JCET missions (Chairman of the Joint Chiefs of Staff, 2014). Mission priority 1B2 covers units, projects, or plans specially approved by the SECDEF of the CJCS including steady state deployments. 1B3 missions cover contingency redeployments, redeployment of special operations forces from real world counter drug and JCET missions, and validated distribution channels (Chairman of the Joint Chiefs of Staff, 2014).

Priority classes 2A and 2B cover lift operations for U.S. and/or foreign forces or activities deploying or positioned and maintained in a state of readiness for immediate combat, combat support, or combat service support, industrial production activities, and CJCS and COCOM sponsored exercises (Chairman of the Joint Chiefs of Staff, 2014). Class 3A and 3B are used when units require airlift for readiness inspections or

evaluations, US or foreign activities that are maintained in a state of readiness to deploy, requirements in support of joint airborne/air transportability training (JA/AAT), combat support training, counterdrug training, service school training, and airdrop certification of new equipment.

The lowest priorities are 4A and 4B. These priorities cover activities tasked for employment in support of approved war plans, static loading exercises, other US and foreign activities that cannot be accommodated by commercial lift and static displays for military and public events (Chairman of the Joint Chiefs of Staff, 2014).

Establishing a Mobility Channel

According to Joint Publication 4-09, a channel mission is an airlift mission that supports global distribution operations over established worldwide routes (combatant command or Service-validated) that are served by scheduled DOD aircraft under AMC control or commercial aircraft contracted and scheduled by AMC (Joint Chiefs of Staff, 2010). These routes support service between two or more points on a recurring basis, with actual movements dependent upon the volume of traffic (Joint Chiefs of Staff, 2010).

To establish a channel route, requests are formally coordinated with the service headquarters (HQ) through the Combatant Command (COCOM) who then becomes the requester of the channel. This request must include the type (distribution, contingency, passenger, cargo, or aeromedical), requested origin and destination, reason for service, and the estimated movement requirements (US Transportation Command, 2011). The channel will then go through a validation process and finally be approved or disapproved

by USTRANSCOM. Upon approval of a channel AMC/FM will identify and forward proposed tariff rates for the approved channel to USTRANSCOM/TCJ8. AMC TACC/XOG will then prepare and distribute a channel sequence listing of all channels as changes occur. TACC/XOG will ensure all channels are reviewed annually and advise USTRANSCOM of those that had not had significant movement for six consecutive months.

US Focus on Africa

With operations in Afghanistan poised to slow the US has an opportunity to shift its strategic focus. On February 6, 2007 President George W. Bush formally announced the creation of a new Unified Combatant Command for the African Continent reflecting Africa's strategic importance to the U.S (Ploch, 2010). Building on this strategic interest the U.S. has placed a sustained presence at Camp Lemonnier in Djibouti. Today, Camp Lemonnier is the centerpiece of an expanding constellation of half a dozen U.S. drone and surveillance bases in Africa, created to combat a new generation of terrorist groups across the continent, from Mali to Libya to the Central African Republic (Whitlock, 2012). This point was further echoed by Colonel David Poage the division chief for international affairs in Africa when he stated "Air power will grow increasingly important across the continent as they patrol borders, fight piracy and extremist groups, and respond to humanitarian crises" (Davis & Everstine, 2014). There are a vast number of areas cited by regional experts and military strategists that address the importance of Africa to the U.S. both economically and strategically. Below are the general areas that are common across both civil and military reports.

The first area addressed is global security. African governments incapable of maintaining sufficient control over their territories or fulfilling the basic needs of their populations can create a permissive environment for criminal and terrorist networks (Banks, et al., 2013). Combined Task Force: Horn of Africa (CJTF-HOA) and other satellite units dispersed throughout the continent do well combating these groups, but the vast geography and unstable borders provide a viable region for criminals and terrorists to operate. The key military strategy to combat this threat is building partnerships. Currently AFRICOM concentrates much of its energies and resources on training and assistance to professionalize local militaries so they can better ensure the stability and security on the continent (Ploch, 2010).

The next area of focus is promoting democracy and economic opportunity. In recent years *The Economist* has referred to Africa as the "Rising Continent" and the Hopeful Continent" (Banks, et al., 2013). This contention was supported by a report in *The Economist* stating between the years 2000 to 2010, six of the world's ten fastest-growing economies were in sub-Saharan Africa (The Economist Online, 2011). This economic rise has attracted many international players including China. China's interest in Africa presents two unique challenges for the U.S. First Chinese funding flows to Africa with "no strings attached" such as requirements on transparency, anti-corruption, environmental protection, human development and better governance (Banks, et al., 2013). This mercantilist approach to Africa undercuts America's economic efforts to promote long term sustainable development and democratic systems.

Concurrent with democratic influence and sustainability the U.S. is also competing internationally for the abundant natural resource wealth within the African

continent specifically oil. Nigeria is Africa's largest supplier of oil and is regularly the fifth-largest global supplier of oil to the U.S (Ploch, 2010). This fact has translated an energy requirement into a military focus. A senior DoD official reportedly commented that "a key mission for U.S. forces (in Africa) would be to ensure that Nigeria's oil fields are secure" (Jaffe, 2010).

Humanitarian operations are another area that continues to draw U.S. interest. There is a moral imperative for the U.S. as a world leader to create dignified living conditions and economic opportunity consistent with our democratic values (Banks, et al., 2013). This attempt to create dignified living conditions focuses on economic, as well as basic human needs. In sub-Saharan Africa alone, 400 million people live in extreme poverty and require interventions that are targeted and complementary to existing support to lift them out of it. Without the support of international aid, most poor people will be left behind (Ntale, 2013). In addition to combating poverty, famine is another area of interest. The severe food insecurity and famine is estimated to have claimed 257,500 lives in Somalia between October 2010 and March 2012, half of which were children under the age of five (Global Humanitarian Assistance Report, 2013). In addition to stabilizing regions by relieving poverty, and famine, humanitarian efforts also combat disease. Safety from "hot-zone diseases" such as ebola is a vital national interest, equivalent in importance to safety from attack by weapons of mass destruction (HENK, 1997).

Logistical Issues in Africa

The phrase "tyranny of distance" has been used in reference to operations in many geographic regions and hold especially true in Africa. In geographic terms Africa is fifty-five nations spread over 11,699,000 square miles. To further illustrate this point Figure 2 depicts the continent of Africa with familiar countries overlaid.

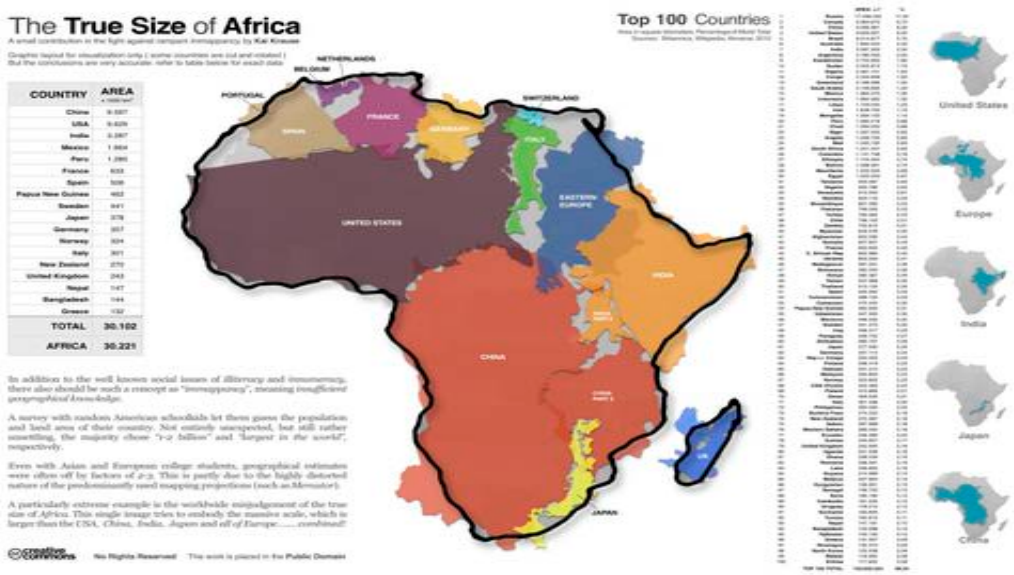


Figure 2. True Size of Africa (Krause, 2010)

Negotiating this distance is a logistical challenge by itself embedded in the vast expanse of the African continent lie additional challenges. Africa's logistics network comprises numerous seaports along the coastline but options are limited in the massive interior of the continent that accounts for one-fifth of the earth's land (Krulick, 2013). Once outside the immediate port areas the real challenge begins. A lack of quality roads and developed

infrastructure continue to impact military as well as commercial operations. Today, getting a container to the heart of Africa—from Douala in Cameroon to Bangassou in the Central African Republic, say—still means a wait of up to three weeks at the port on arrival; roadblocks, bribes, pot-holes and mud-drifts on the road along the way; malarial fevers, prostitutes and monkey-meat stews in the lorry cabin; hyenas and soldiers on the road at night (Bollore, 2008). The costs of fuel and repairs make even the few arterial routes (beyond southern Africa) uneconomic. A study by America's trade department found that it cost more to ship a ton of wheat from Mombasa in Kenya to Kampala in Uganda than it did to ship it from Chicago to Mombasa (Bollore, 2008). Using an American or European infrastructure view to relate to moving goods in Africa is simply impractical. Figure 3 below highlights the major road, rail and waterway access available within the African continent.

Figure 3. Major Road, Rail and Water routes in Africa (Bollore, 2008)

As you can see using transportation mediums such as road, rail and water provide only limited access throughout the continent. According to General William Ward former

AFRICOM Commander “heavy lift capability remains at the top of the requirements list for the nascent U.S. Africa Command” (Defense Daily International, 2008)

Given the trouble land based travel offers the alternative for military operations is to route cargo and personnel by air. Air travel does not possess the myriad of challenges found in land or water based routes, but is not without its own set of complexities. One of the major complexities of military flight operations throughout Africa is diplomatic clearance. Flying a military aircraft through the airspace of a sovereign nation requires a diplomatic clearance provided by that nation’s government. Negotiating these clearances can sometimes be complicated as noted during the redeployment of forces from Exercise Natural Fire in 2010. During this exercise U.S. Air Force C-17s allocated to redeploy forces were retasked to a higher priority mission. Diplomatic issues prevented assets from the Heavy Airlift Wing (HAW) in Papa, Hungary from providing this lift. In the end it took three weeks for AFRICOM to obtain clearance and recover the troops and equipment from this exercise (Gaddis, 2012).

The other major challenge when it comes to airlift is infrastructure. Much of Africa is defined by an austere landscape with the same short-airfield characteristics encountered in Vietnam (Krulick, 2013). Another issue built within infrastructure is access to fuel. As discussed earlier in this section movement within the continent is difficult. Therefore providing a regular supply of aviation fuel to all but major airports can be a daunting task. This requires mobility airlift assets to either carry the fuel required for the return trip which could render them unable to land, or operate only in the radius of major airports again constraining the distribution network.

One option to mitigate the challenges of military airlift is to source cargo via commercial contracts. While this option places the logistical burden on the contract carrier there is still the process of finding the contract lift. According to Department of Defense Instruction 4500.53 the DoD can only contract with companies that are approved by the Commercial Airlift Review Board (CARB), and only a handful of CARB certified carriers are currently working in Africa (Gaddis, 2012).

If the DoD is going to continue to operate in Africa it must find a way to strike the optimal balance between organic and contract cargo and passenger delivery. Continued interest in the region and a routine delivery schedules will bolster infrastructure, increase access and enhance logistical capabilities.

Summary

This literature review opened with the need for AMC to continue to operate globally for the development of its aviator corps. To continue to operate globally AMC needs a source of funding for flight hours. The second part of this review covered the two primary sources of funding for AMC flight hours. The primary source of funding is the TWCF, also different mission options available to DoD customers were outlined. The literature review concluded with a look at US strategic interests in Africa as well as some of the logistical challenges the continent possesses.

III. Methodology

Chapter Overview

This chapter begins with a review of AMC channel requirements and a quantitative look at historical airlift demand in Africa. It takes a qualitative look at specific airfields in Africa to assess their viability. Next, survey data from AMC C-5 and C-17 Commanders and Operations officers was compiled to assess if there is a presumed lack of mobility experience in Africa and therefore desire for more flight hours in the region. Data provided by AMC/A9 was used to assess the total number of flights, cargo and passengers moved within the region. Airfields were ranked by total sortie count and aggregate cargo demand to assess if a reoccurring need for airlift is present. The fields with suitable cargo volume were then analyzed for viability. Traits such as what aircraft can be supported, what services are available, and the possibility for AMC crewmembers to remain overnight (RON). Finally, survey data from active duty C-5 and C-17 Squadron Commanders and Operations Officers established if there is a desire in the active duty force for planned or regular flight opportunities in the African theater of operations.

Why a Mobility Channel

This research centers around two key assumptions. First, is that military operations in Afghanistan will scale back dramatically after 2014 and this will create a need for airlift options within the AMC fleet. Next, this excess capacity will generate the need for consistent predictable airlift missions to ensure a proficient experienced corps of mobility aviators. The established route structure and reoccurring nature of channel

missions allow active duty and reserve squadron leadership the mechanism to train, season and maintain currency within their crew force. A large variety of reoccurring channel lift options would provide consistent mobility lift across multiple COCOMs allowing squadron leadership to increase global exposure and build a breadth of experience within their ranks.

Determining Airlift Demand in Africa

As stated previously, establishing a routine mobility channel requires a schedule of movement and a specific set of requirements. Defense Transportation Regulation 4500.9-R states that a channel is required to have a minimum value of twenty-five short tons or service a hard lift location where there is little or no commercial business options (US Transportation Command, 2011).

Data provided by AMC/A9 was analyzed to assess the potential for a routine airlift schedule. The human error present during data entry is deemed negligible to the overall analysis. The sortie data was pulled from the Reliability and Maintainability Information Systems (REMIS). REMIS is a large, complex legacy information system featuring a centralized database containing Air Force-wide inventory, status, utilization, maintenance, and configuration data (Air Force Materiel Command-Department of the Air Force, 2011). This initial data pull provided a list of all AMC organic and contract sorties from October 1, 2011 thru August 1, 2013. This data was then scaled down to include only the sorties that landed in or had a cargo or passenger movement within the AFRICOM area of responsibility (AOR). Although outside AFRICOM's AOR as

depicted in Figure 2, Egypt was left in the data set due to its location on the mainland African continent.

Figure 4: AFRICOM GEOGRAPHIC AREA OF RESPONSIBILITY (US Navy)

The data from REMIS was listed in chronological order base on mission number and Julian date. The initial data set contained thirty-eight data column values for each sortie. To scope the analysis all applicable data fields unrelated to location, aircraft type, cargo, or passenger count were eliminated. The REMIS data was then grouped by country for candidate assessment. Each standalone country was then internally sorted by airfield serviced to assess not only the frequency of flights to that country, but also to illustrate which airfields had adequate cargo volume. The two key metrics used for comparison were average cargo per sortie, and ratio of sorties with over twenty five short tons to total sorties. The country and airfield specific data totals are located in (APPENDIX A).

Assessing Location Operability

Once demand in a region was established and a channel was proposed the next step is to evaluate the region for usability. According to Defense Transportation Regulation 4500.9-R (Appendix P) the 618th Tanker Airlift Control Center (TACC) will review adequacy of support resources at proposed ports of embarkation and debarkation, and review the diplomatic, political and country clearance considerations. The AMC/A9 provided REMIS data contained flights to 46 countries including 91 independent operation locations. Since the focus of this research is regular channel operations, airfields with less than eighteen flights were eliminated from review. The number eighteen was chosen as a target since it mimicked a regular (monthly) requirement. To accomplish this review a qualitative approach was taken with reference to the Foreign Clearance Guide (FCG), Airfield Suitability and Restrictions Report (ASRR), and AMC Giant Report data.

This analysis focused on the following questions:

1.) Does the airfield have infrastructure that will allow regular C-5 and C-17 operations?
2.) Are there any specific restrictions or limiting factors on aircraft servicing at this location (fuel, oxygen, power)?
3.) Are there facilities to RON at this location or is it only available as an intermediate stop?
4.) Are there force protection issues at this airfield that require an onboard security team (Ravens)?

5.) Are there any flight frequency issues or other diplomatic restrictions annotated in the FCG?

6.) Are there any specific cargo restrictions at this location?

Qualitative Demand for Flight Operations in Africa

This research thus far has addressed the demand and feasibility of regular flight operations in Africa. The key assumption for this section is that in a post 2014 environment, CENTCOM specific cargo demand will not support enough flight hours to maintain currency and proficiency across the AMC crew force. This will create a need to find new areas to operate that have a demand for support, but also support America's strategic interests and provide training value to the mobility force.

To address the question of "which geographic region would provide the most training value to the mobility crew force" a survey was created. Since this research centered on channel airlift in large mobility aircraft the target audience of the survey was all current active duty C-5 and C-17 Squadron Commanders and Operations Officers. The survey was designed to receive input from those leading at the tactical level within AMC. The survey sought the expert opinion of the flying squadron command staff to determine where they thought the best opportunities were for flight hour utilization and mobility force development.

The survey method chosen was a self-administered survey based on the methodology in the Survey Fundamentals Guide published by the Office of Quality Improvement University of Wisconsin-Madison as seen in Figure 3.

Figure 5. Survey Process (Wisconsin-Madison, 2010)

The questions were developed with the target audience in mind, so it was assumed that the respondents possessed the necessary expertise to understand the mobility operations specific terminology presented in the survey. The sample questions were then tested on a small subgroup of prior Operations Officers not included in the survey to ensure reliable and valid data would be obtained. The survey was administered via government e-mail, and presented in a word document. The time frame of the survey was set for thirty days. This duration was selected for two reasons, first it allowed for time to digest the questions which enhanced the data received in the "why" segments. It also accounted for leave or temporary duty that would keep the potential respondents away from their government e-mail.

The survey consisted of six questions designed to establish a baseline for the current perception of mobility aircrew experience and examine what geographic regions squadron leadership thought their crew lacked exposure to, or could use additional experience.

Question 1: Which COCOM AOR/geographic region do you feel your pilots are the most experienced operating within?

The purpose of this question was to establish where the squadron leadership thought their pilots were the most experienced. This was intended to assess where the

bulk of recent operations were and where leadership felt the most confident letting their crew force operate.

Question 2: Which COCOM AOR/geographic region do you feel your pilots are least experienced operating within?

This question was the designed to ascertain in general terms where squadron leadership thought their crew force had the least amount of operating experience. It was purposely direct to capture a one region style answer.

Question 3: Operations within which COCOM AOR/geographic region do you feel would add the most value to your mobility aircrew development?

Here the questions become more open-ended and allow the respondents to not only state a region but to explain why, and the benefits of operating within that region.

Question 4: Disregarding sortie complexity (combat, night operations, multi stops, AR, etc.) which geographic region creates the highest pre-launch ORM? Why?

Question 4 changes the focus slightly and shifts the thought from overall experience to risk. Prior to mission execution the Commander, Operations Officer, or designated representative must sign the aircrew orders validating that all prelaunch requirements and risk assessments have been accomplished. This allows the respondents some latitude in their response on why they think some regions carry more risk than others.

Question 5: If given the choice to handpick the crew you were sending to the region cited in question 2 what would be your optimal make-up (Evaluator led crew, all instructors, Aircraft CCs or experienced Enlisted aviators), and why would you include members with those qualifications?

Question 5 pulled data from question 2 to break down the experience level in the squadron and determine what the crew allocation would be assuming a flight in the region least experienced region. Data from this question will be used to see where if anywhere regional experience lies in the squadron and what steps squadron leadership would take to spread that experience assuming flights in that region became available.

Question 6: Assuming a reduction in operations to Afghanistan where would you like to see more channel routing to aid in mobility force development. Why?

The final question focused on one of the key assumptions embedded within this research. It assumed the reduction in CENTCOM operations and let the Squadron leadership choose where they thought the most mobility development would occur. The open-endedness of this question leveraged the ability to speak to the potential of emerging theaters, or simply state where there is a lack of current experience within the squadron.

Assumptions

The following assumptions are the basis of the above methodology and set the fundamental framework for the analysis to follow.

1. Large scale operations in the CENTCOM AOR will cease in 2014 resulting in a reduction of regional demand.
2. Despite budget issues within the government, AMC will have the funding available to conduct global mobility operations commensurate with aircrew currency levels.

3. There will not be a large scale conflict that directs mobility lift priority to another geographic region.
4. Crew ratios and airlift assets will remain close to current levels.
5. AMC will be willing to fly less than full aircraft, or split hours allocations between TWCF and O&M funding.

Summary

This chapter covered the general methodology that was used to assess the feasibility of additional channel lift in Africa. It discussed what historical data was used to assess demand, and how this data was used to select potential candidate airfields. It then discussed the process that will be used to assess these airfields for suitability. Finally, this chapter outlined the survey questions that will be used to determine if there is a "want" in the C-5 and C-17 active duty force for more flight opportunities within the African Theater.

IV. Analysis and Results

Chapter Overview

This chapter frames the potential flight hour surplus generated by a reduction in operations in Afghanistan. African sortie data from REMIS was used to evaluate potential candidates for reoccurring mobility lift. These candidates were assessed using the AMC giant reports and the foreign clearance guide to determine if there are any disqualifying factors. Finally, since there are multiple options for AMC to satisfy the additional demand for flight hours, survey data from AMC squadron leadership was analyzed to assess the desire for additional airlift opportunities in Africa. The chapter presents the analysis broken into three sections: demand, feasibility, and desire for theater exposure.

Need for Additional Flight Hours

One of the key factors embedded in this research is that there will be a need for additional mobility flight hours and route structure to compensate for the reductions post operations in Afghanistan. Data provided from AMC/A9 for calendar year 2012 stated that the total C-17 operational mission hours were 180,684.3 and the total operational C-5 hours were 26,803.7. The 2013 Fiscal Year active duty flying requirement contends that 77% of C-17 and 86% of C-5 will come from user funded expense missions as previously shown in Figure 1. With the proposed reduction of troops in Afghanistan to 10,000 by FY 2015, AMC will be in need of customers and geographic regions to meet their need for flight hours (USTRANSCOM, Global Operational Assumptions, 2014).

Demand

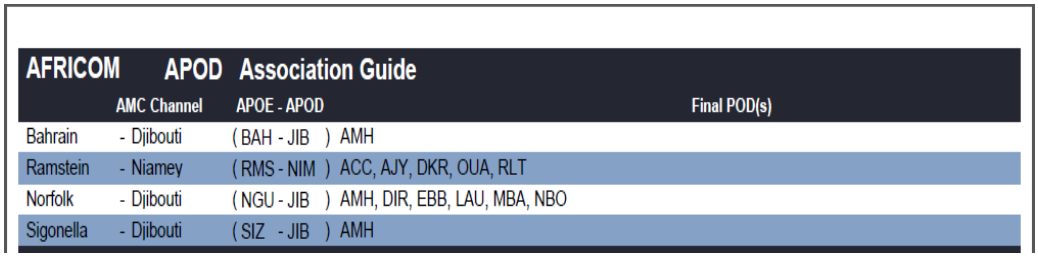
To assess the potential for additional channel lift in Africa historic sortie demand data was used. The REMIS data provided by AMC/A9 was filtered to display only AMC sorties that landed on the African continent. This data was further broken down into AMC sorties per country and is depicted in Table 1.

Table 1. REMIS Breakdown of AMC Sorties per Country

Country	AMC Sorties
Djibouti	616
Ethiopia	124
Mali	104
South Africa	90
Niger	89
Senegal	76
Libya	44
Kenya	39
Tanzania	39
Chad	36
Cape Verde	30
Uganda	30
Morocco	29
Mauritania	28
Botswana	27
Burkina Faso	25
Cameroon	18
Congo	16
Nigeria	16
Algeria	14
Seychelles	13
Ghana	12
Sudan	12
Burundi	10
Malawi	10
Liberia	9
Gabon	6
Mauritius	6

Rwanda	6
Ivory Coast	5
Angola	4
Madagascar	4
Mozambique	4
Sierra Leone	4
Guinea	3
Central African Republic	2
Namibia	2
Sao Tome	2
Benin	1
Egypt	1
Equatorial Guinea	1

Since channel operations function on a regular schedule, assuming cargo demand is met, a regular demand needed to be present. Since the data provided covered eighteen months the minimum sortie per country required for further assessment was set at eighteen denoting a one sortie per month average. This reduced the total candidates for African lift from forty-one to seventeen. The expanded breakdown of the seventeen candidate countries can be found in Appendix A. With seventeen candidate countries established, they were individually assessed for total AMC sorties, cargo demand (total and per sortie), and passenger demand (total and per sortie). Due to a high volume of low capacity intra-theater sorties none of the candidates sustained a twenty-five short ton per sortie average channel mission qualifier. To assess viability of potential candidate airfields, a baseline was established using locations from two previously validated channels as depicted in Figure 4 and Figure 5. The airfields chosen as a baseline were Djibouti (HDAM) Table 2 and Niger, Diori Hamani (DRNN) Table 3.



AFRICOM APOD Association Guide

	AMC Channel	APOE - APOD	Final POD(s)
Bahrain	- Djibouti	(BAH - JIB)	AMH
Ramstein	- Niamey	(RMS - NIM)	ACC, AJY, DKR, OUA, RLT
Norfolk	- Djibouti	(NGU - JIB)	AMH, DIR, EBB, LAU, MBA, NBO
Sigonella	- Djibouti	(SIZ - JIB)	AMH

Figure 6. Current African Channels in AMC Air Channel Sequence Listing (618th Air and Space Operations Center(TACC), 2013)

A. ESTABLISH CARGO CHANNEL SIGONELLA NAS, ITALY (LICZ/SIZ) TO DJIBOUTI AMBOULI, DJIBOUTI (HDAM/JIB).

B. AMEND APOD ASSOCIATION GUIDE TO INCLUDE ASSOCIATION OF ARBA MINTCH, ETHIOPIA (HAAM/AMH) UNDER THE NORFOLK NAS, VA (KNGU/NGU) TO DJIBOUTI AMBOULI, DJIBOUTI (HDAM/JIB), BAHRAIN (OBBI/BAH) TO DJIBOUTI AMBOULI, DJIBOUTI (HDAM/JIB) AND THE SIGONELLA NAS, ITALY (LICZ/SIZ) TO DJIBOUTI AMBOULI, DJIBOUTI (HDAM/JIB) CHANNELS.

C. EFFECTIVE 01 DEC 13, ESTABLISH CARGO AND PASSENGER CHANNEL RAMSTEIN AB, GERMANY (ETAR/RMS) TO DIORI HAMANI, NIGER (DRRN/NIM).

D. EFFECTIVE 01 DEC 13, AMEND APOD ASSOCIATION GUIDE TO INCLUDE ASSOCIATION OF ACCRA, GHANA (DGAA/ACC), AGADES, NIGER (DRZA/AJY), DAKAR, SENEGAL (GOOY/DKR), OUAGADOUGOU, BURKINA FASO (DFFD/OUA) AND ARLIT, NIGER (DRZL/RLT) UNDER THE RAMSTEIN AB, GERMANY (ETAR/RMS) TO DIORI HAMANI, NIGER (DRRN/NIM) CHANNEL.

Figure 7. AMC Channel Sequence Listing Change 4 FY14 (EFF 06 NOV 13)

Table 2. REMIS Data from Djibouti Amdouli (HDAM)

Djibouti					
HDAM: Djibouti Amdouli					
	Aggregate	**HDAM**			
Total Sorties	616	616			
	Commercial Carrier	**C-17**	**C-5**	**C-21 / C-12**	**KC-10**
Sorties by Aircraft type	215	350	29	21	1
	Total(STONS)	**HDAM**			
Cargo	10304.502	10304.50			
Cargo average/Sortie	16.73	16.73			
Sorties > 25 STONS	168	168			
	Total	**HDAM**			
Passengers	8490	8490			
Passenger average/sortie	13.78	13.78			

Table 3. REMIS Data from Diori Hamani (DRRN), Diffa (DRZF), and Arlit (DRZL)

Niger				
DRRN: Diori Hamani **DRZF:** Diffa **DRZL:** Arlit				
	Aggregate	**DRRN**	**DRZF**	**DRZL**
Total Sorties	89	87	1	1
	Commercial Carrier	**C-17**	**C-5**	
Sorties by Aircraft type	30	58	1	
	Total(STONS)	**DRRN**	**DRZF**	**DRZL**
Cargo	1453.18	1434.98	0	18.2
Cargo average/Sortie	16.33	16.49	0	18.2
Sorties > 25 STONS	31	31	0	0
	Total	**DRRN**	**DRZF**	**DRZL**
Passengers	490	477	13	0
Passenger average/sortie	5.51	5.48	13.00	0

With HDAM and DRRN removed from the list as baseline qualifiers, there were fifteen remaining canidate countrys. Specific airfields within these countries were then qualified using the same sortie voulme per location metric. If a specific airfield did not meet the eighteen sortie minimum it was eliminated from cotention. The country/airfield pairs that satisified the initial sortie volume requirement are listed below in Table 4.

Table 4. African Airfields with Adequate sortie Volume

Country	Airfield
Burkina Faso	DFFD
Cape Verde	GVAC
Chad	FTTJ
Ethiopia	HAAB
Ethiopia	HAAM
Kenya	HKMO
Kenya	HKJK
Libya	HLLT
Mail	GABS
Mauritania	GQNN
Senegal	GOOY
South Africa	FAWK
South Africa	FACT
South Africa	FALA
Tanzania	HTDA
Uganda	HUEN

With an acceptaible airfield sortie volume established two comparitave metrics were developed using Djibouti (HDAM) and Diori Hamani (DRRN). The first metric used as a basis of comparison was cargo average per sortie. As stated in Table 2 the average cagro per sortie in Djibouti was 16.73 short tons. The average short tons per sortie in Diori Hamani was 16.33 as depicted in Table 3. The next metric used for validation was total number of sorties with over twenty-five short tons of cargo divided

by the total number of AMC sorties. This ratio will be used to evenly compare airfields with different sortie volume levels. Using the data in Table 2 and Table 3, the ratio for HDAM was 168 / 616 or .2727. The ratio for DRRN was 31 / 89 or .3483. For ease of reference the qualifying ranges are depicted below in Table 5.

Table 5. Average Cargo per Sortie and Percentage of missions with over 25 STONS of Cargo

	Djibouti	Niger
Average cargo/sortie(STONS)	16.73	**16.33**
25+ STON sorties/total sorties	**0.2727**	0.3483

The metrics in Table 5 were applied to the candidate airfields from Table 4 and sorted below in Table 6 and Table 7 from largest to smallest.

Table 6. Average Cargo load per Sortie

Country	Airfield	Average cargo STON/sortie
Kenya	HKMO	23.62
Cape Verde	GVAC	21.46
Mauritania	GQNN	19.65
South Africa	FAWK	18.45
Chad	FTTJ	16.6
Senegal	**GOOY**	***16.35***
Uganda	HUEN	16.05
South Africa	FALA	15.94
Mali	GABS	14.2
Kenya	HKJK	12.66
Ethiopia	HAAB	8.84
Tanzania	HTDA	8.76
South Africa	FACT	8.34
Ethiopia	HAAM	8.18
Libya	HLLT	5.68
Burkina Faso	DFFD	1.54

Table 7. Ratio of Sorties with Over 25 STONS to Total Sorties

Country	Airfield	25+ STON sorties/total sorties
South Africa	FALA	0.4737
Chad	FTTJ	0.4166
Cape Verde	GVAC	0.4
Mauritania	GQNN	0.36
Mali	GABS	0.3297
South Africa	FAWK	0.3125
Senegal	**GOOY**	**0.2895**
Uganda	HUEN	0.2333
South Africa	FACT	0.2143
Tanzania	HTDA	0.1944
Libya	HLLT	0.1923
Kenya	HKJK	0.15
Kenya	HKMO	0.1053
Ethiopia	HAAB	0.093
Burkina Faso	DFFD	0.04
Ethiopia	HAAM	0.026

When Table 6 was compared to Table 7 the airfields that met both the average cargo per sortie requirement and the 25 short ton to total sortie ratio were:

Cape Verde (GVAC), Mauritania (GQNN), Chad (FTTJ), Senegal (GOOY), South Africa (FAWK)

South Africa (FAWK) was omitted due to a large portion of the airlift being in support of one specific event and although there was a large volume of lift it did not possess a reoccurring demand.

Feasibility

The airfields that met both the sortie and cargo requirements were examined for accessibility using the AMC giant report, the Foreign Clearance Guide and a great circle

distance calculator. Key factors that will be assessed will be suitability, local operating issues and challenges, and a distance comparison to the existing ETAR – DRRN channel.

Senegal (GOOY)

According to the AMC giant report there are no suitability restrictions on C-5 or C-17 aircraft with a primary runway length at Leopold Sendar Senghor International of 11,450 feet. The host nation requires passports with at least six months of validity, and Visas if transit personnel are leaving the airport. Senegal has issued US aircraft a blanket over flight and landing clearance with a requirement for fourteen day prior notification for overflights and landings. Leopold Sendar Senghor International (GOOY) is the only airport in Senegal authorized for arrival and departure. Customs and immigration are available twenty-four hours a day, and the United States Defense Attaché Office(USDAO) is available for assistance. Fuel and expediter services can be paid with the AIR Card, but crews will be assessed landing fees ranging from $6,500 to $8,000 which must be paid in cash. Per the foreign clearance guide multiple lodging options are available, and can be coordinated via the USDAO, as long as the AMC Threat Working Group (TWG) approves remain overnight (RON). The great circle distance from Ramstein Air Base (ETAR) to DRRN is 2,497 miles. The distance from ETAR to GOOY is 2,780 miles which is 283 miles greater than the established channel. Using planning factors from AFPAM 10-1403 a direct flight would increase one way flight time compared to the ETAR - DRRN channel by 34 minutes. GOOY has a military as well as civilian ramp and provides acceptable infrastructure and support options for routine flight operations.

Cape Verde (GVAC)

According to the AMC giant report there are no suitability restrictions on C-5 or C-17 aircraft with a primary runway length of 10,735 feet. The host nation requires passports but will make an exception if the aircrew remains on the airport and departs on the same aircraft. Cape Verde has issued US aircraft a blanket over flight and landing clearance with a requirement for fourteen day prior notification. GVAC is one of two airports in Cape Verde authorized for arrival and departure. Customs and immigration are available twenty-four hours a day, but there is no US Embassy support on the island which should not impact operations since the AIR card is accepted. Fuel and expediter services can be paid with the AIR Card. Two lodging options are available within 17 kilometers of the airport as long as the AMC Threat Working Group (TWG) approves remain overnight (RON). It was reported that landing fees were required to be paid exact change in cash. The baseline great circle distance from ETAR to DRRN is 2,497 miles. The distance from ETAR to GVAC is 2,828 miles which is 331 miles greater than the established channel. Using planning factors from AFPAM 10-1403 a direct flight would increase one way flight time compared to the ETAR - DRRN channel by 41 minutes. Overall GVAC has acceptable infrastructure and support options for routine flight operations.

Mauritania (GQNN)

According to the AMC giant report there are no suitability restrictions for the C-17, but this field is currently restricted for C-5 operations. The primary runway length available is 9,843 feet. The host nation requires passports for stays of one night and requires a visa if the planned stay is longer than one night. Mauritania requires a

diplomatic clearance for overflight and landing with a lead time of ten days. GQNN is one of two airports in Mauritania authorized for arrival and departure. Customs and immigration are available twenty-four hours a day but flights landing between 2400L and 0600L require advance coordination due to quiet hours. The status of forces agreement exempts US aircraft from landing and navigation fees. Any fuel requests over sixty thousand liters need to be coordinated seventy-two hours prior, and the AIR Card is an acceptable method of payment. All other services must be paid in cash. The foreign clearance guide states that quality hotels are available, but also warns of the activity from terrorist groups such as al-Qaida in the Islamic Maghreb (AQIM). The AMC Threat Working Group (TWG) would have to make the determination on remain overnight (RON) options. The baseline great circle distance from ETAR to DRRN is 2,497 miles. The distance from ETAR to GQNN is 2,527 miles which is 30 miles greater than the established channel. Using planning factors from AFPAM 10-1403 a direct flight would decrease one way flight time compared to the ETAR - DRRN channel by 3 minutes. Overall GVAC has acceptable infrastructure and support options for routine flight operations.

Chad (FTTJ)

According to the AMC giant report there are no suitability restrictions on C-5 or C-17 aircraft with a primary runway length of 9,186 feet. The host nation only requires military orders and identification card for entry and exit however if a military passport is used a visa is required. Chad has issued US aircraft a blanket over flight and landing clearance with a requirement for seven day prior notification. FTTJ is the only airport in Chad authorized for arrival and departure. Customs and immigration are only

available during daylight hours. All landing, parking, and lighting bills are processed by the USDAO. The most current fuel contract information is located on the Defense Logistics Agency (DLA) "FBO Locator – Worldwide Merchant Directory Search." These merchants accept the AIR card. There is limited material handling equipment that can be rented from local airlines and is very expensive. Additionally, there is a lack of qualified ground crew on the airfield. Chad has no known threats, but caution should be exercised in the region. Two hotels are available within N'Djamena if RON operations are approved by the AMC TWG. The baseline great circle distance from ETAR to DRRN is 2,497 miles. The distance from ETAR to FTTJ is 2,605 miles which is 108 miles greater than the established Channel. Using planning factors from AFPAM 10-1403 a direct flight would increase one way flight time compared to the ETAR - DRRN channel by 9 minutes. Overall GVAC has acceptable infrastructure and support options for routine flight operations.

Desire for Theater Exposure

Over the past three years, operations within the CENTCOM AOR have accounted for forty-three percent of C-17 sorties (Anderson, 2014) . With CENTCOM operations poised to meet a drastic reduction, AMC is going to need to find other regions to conduct flight operations that will in turn maintain the currency, proficiency and provide future development of the mobility force.

To establish where AMC squadron leadership saw the most valuable training opportunities, a six question survey was sent via e-mail to all current active duty C-5 and

C-17 Squadron Commanders and Operations Officers. The survey targeted twenty-four members and received responses from thirteen, achieving a respondent rate of 54%.

Within this section this research will make reference to different regions and US Combatant Command AORs. Figure 6 provides a graphical representation of each Combatant Command AOR. Figure 6 has all COCOMs abbreviated so for reference each Combatant Command is listed with its specific abbreviation.

US Northern Command (NORTHCOM)
US Pacific Command (PACOM)
US Southern Command (SOUTHCOM)
US European Command (EUCOM)
US Africa Command (AFRICOM)
US Central Command (CENTCOM)

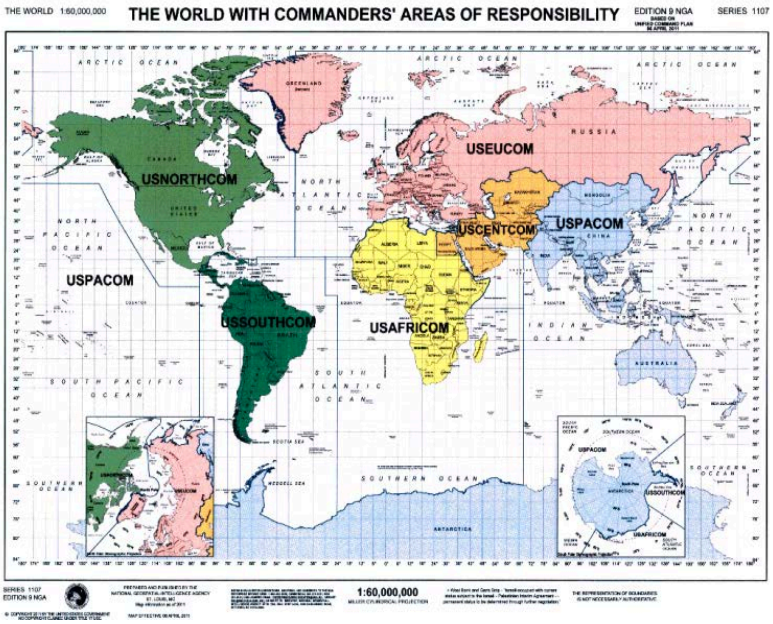


Figure 8. Geographic Map of US Combatant Commands

Question 1 established where the AMC squadron leadership felt their aircrew was the most experienced. Results from survey question 1 are provided below in Figure 7.

Squadron leadership cited multiple deployments since 2003 and routine tasked missions spanning the CENTCOM and EUCOM AOR. This relative frequency of operations from home station and in the deployed environment caused missions to the CENTCOM AOR to be regarded as normal operations. The familiarity with the EUCOM AOR was attributed to the frequency of using locations in Europe to crew rest or stage from in support of CENTCOM missions.

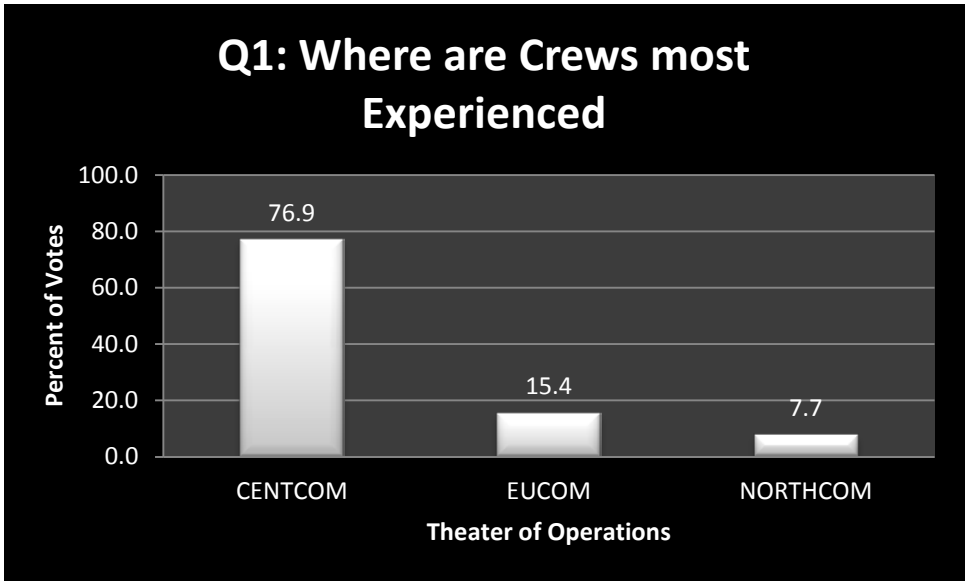


Figure 9. Q1: Where are Crews Most Experienced

The second survey question was used to set a baseline of where the AMC squadron leadership felt that their aircrew had the least operational experience. As shown in Figure 8 the two areas that garnered the most responses were SOUTHCOM and AFRICOM. These areas were highlighted due to the lack of regularly scheduled AMC missions in these regions. Squadron leadership highlighted this lack of experience with comments such as: ”I have pilots who have never flown a mission in South America”,

and “we just don’t get missions tasked to these regions that often.” Squadron leadership from Charleston AFB did cite a slightly more robust experience level in the AFRICOM AOR due to having a higher than normal mission tasking to that region, but echoed the lack of experience in SOUTHCOM as well as PACOM.

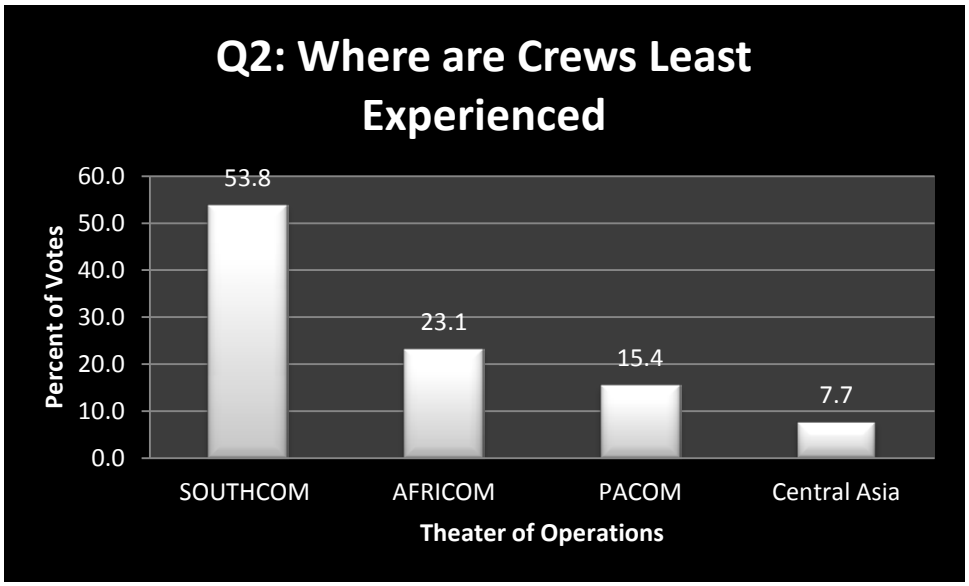


Figure 10. Q2: Where are Crews Least Experienced

Survey question 3 addressed which geographic region would add the most training value as depicted in Figure 9. The two top regions were a bit closer here but were cited for very different reasons. PACOM was highlighted due to the “rebalance of forces” in the Pacific. Additionally squadron leaders added that additional exposure to this theater would provide AMC crews valuable experience for our future fight. Training benefits cited in PACOM were multiple oceanic clearance requests, the mission planning requirements of operating over long oceanic legs, and an operating environment very different that the CENTCOM AOR. The respondents who selected AFRICOM cited a complex airspace structure with very limited command and control. The leadership felt

this ability to work semi-autonomously in a complex environment would build skills that are transferable in not only a conflict, but in a Humanitarian Assistance and Disaster Relief (HADR) efforts.

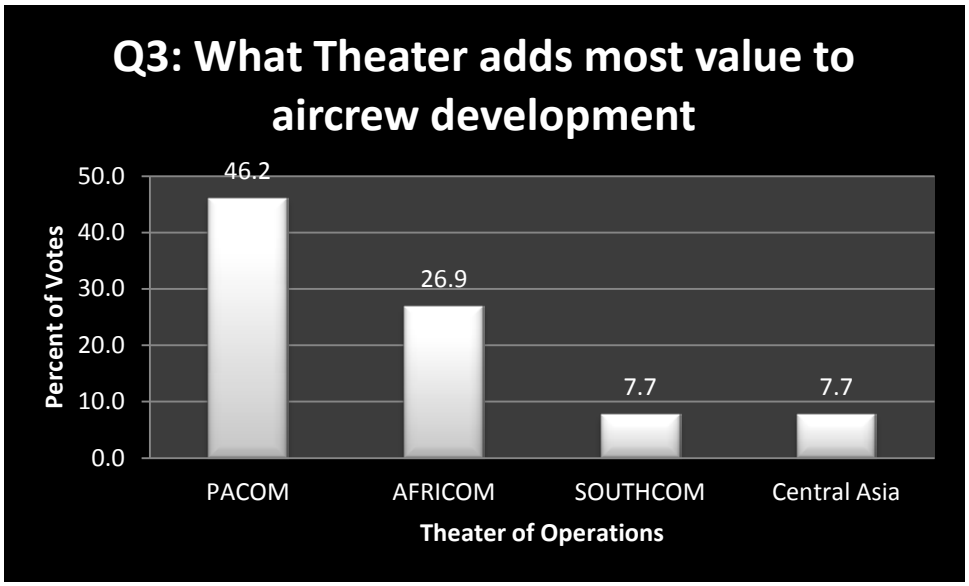


Figure 11. Q3: What Theater Adds the Most Value to Aircrew Development

Survey question 4 addressed which geographic region created the highest pre-launch risk with a focus on crew experience in the region. AMCI 90-903 directs the individuals that must assess risk prior to every AMC mission. The tier 1 risk assessment is done by the initial mission planners. Tier 2 is accomplished by the assigned Wing's Current Operations. The tier 3 assessment is accomplished by the squadron leadership, and the final tire 4 assessment is performed by the aircrew flying the mission. This question focused on the tire 3 assessments since AMC 90-903 states that "tier 3 will be accomplished by squadron level, or equivalent, leadership. Examples would include home station and deployed squadron commanders/deputies, squadron operations

officers/deputies, en route stage location leadership or those designated by the squadron commander" (Air Mobility Command , 2007). As depicted in Figure 10 the regions Commanders and Operations Officers perceived the highest pre-launch risk were AFRICOM and SOUTHCOM. The areas primary reason for this pre-launch risk were lack of overall experience, lack of established Command and Control, terrain, language barriers, and areas of uncontrolled airspace. Lack of experience was addressed in survey question 2 and these concerns carried forward to prelaunch risk. Crewmembers experience in a region is one way leadership cited risk could be mitigated, but without that they had to rely on overall aviation experience. The lack of Command and Control also raised the prelaunch risk. This lack of reach back ability left aircrew to function somewhat autonomously in an unfamiliar region. Finally terrain, airspace and language barriers were cited. A few respondents cited that these issues could be mitigated with simulator profiles but they would much rather have aircrew members with experience in the region.

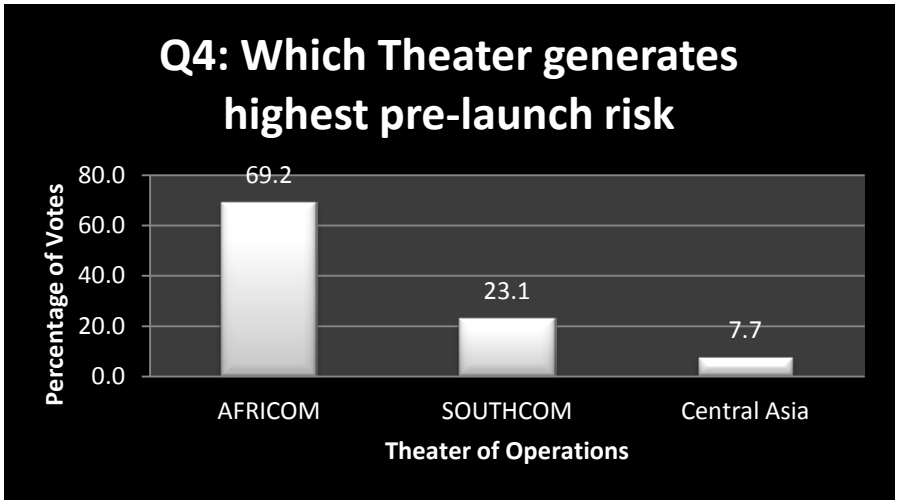


Figure 12. Q4: Which Theater Generates the Highest Pre-launch Risk

Question 5 built on questions 2 and 4. Figure 11 shows what qualification level leadership would prefer to be in command of flight operations in high risk environments. Over 85% of the respondents selected an instructor or evaluator led flight crew. This was primarily to leverage their previous experience since the bulk of the crew would be unfamiliar with this region. A key point, added by all the respondents, is that they would send additional flight crew at every qualification level to increase exposure to austere or rarely traversed flight environments. Within the responses to question 5 were many comments in concert with question 4. Although squadron leadership could mitigate some risk factors with experience and simulator profiles, the first option would always be to find aircrew experienced in the region and use them to educate the rest of the crew. This practice is commonly used during deployment transitions when members of the deployed squadron fly mixed with members of the incoming squadron to share lessons learned.

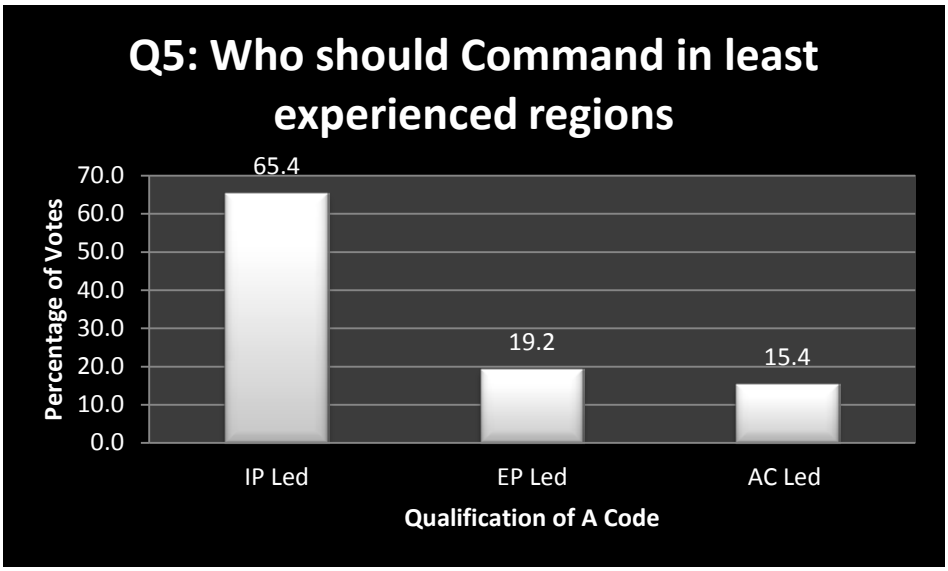


Figure 13. Q5 Who Should Command in Theaters where Crews are Least Experienced

Question 6 gave the AMC squadron leadership a chance to select the geographic region that they felt would provide the best training and development for mobility aircrew. The results are located in Figure 14. PACOM was the location selected most frequently. This was mainly due to the rebalancing in the Pacific and the perceived policy shift to operations there. Squadron leadership saw this emerging operating environment posing challenges very different that those crews have become comfortable with in the CENTCOM AOR. The primary areas highlighted were long oceanic legs, language barriers, and minimal enroute divert options. Squadron leadership contended that these challenges could be easily mitigated given a higher volume of operations in the area.

The location with the second largest frequency of selection was SOUTHCOM. SOUTHCOM was highlighted due to its complicated operating environments paired with its proximity to the US. Squadron leadership felt that regular missions to the SOUTHCOM AOR would provide aircrew experience to a region many of them had little to no experience in. Additionally given the proximity to AMC bases within the United States this region would offer the ability to fly multiple legs in a short amount of overall flight time. These reoccurring missions to SOUTHCOM would require less overall flight time than those to locations with oceanic crossings, but provide similar experience in complex airspace

The final named selection was AFRICOM. AFRICOM was highlighted for having complicated airspace and low command and control support, but fell to third in the rankings due to its distance from the US. The majority of squadron leadership surveyed thought that there was potential for additional operations in this theater and that

missions to Africa would provide excellent aircrew training. The leadership surveyed did however state that the hours spent getting an aircraft to the AFRICOM AOR as compared to volume of cargo moved would be relatively low and that these flight hours could be used more judiciously focusing operational needs to PACOM and training options to the closer SOUTHCOM AOR.

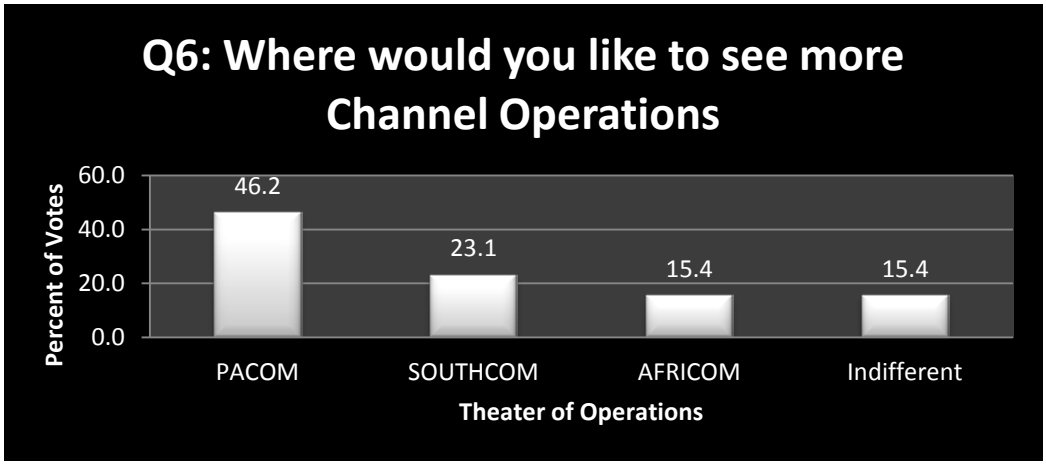


Figure 14. Q6 Where would you like to see more Channel Operations

The survey painted a clear picture that AMC Squadron Commanders and Operations Officers thought that their crews were very experience in the CENTCOM AOR due to years of high volume operations. The region where squadron leadership perceives it has the least experience is SOUTHCOM. PACOM is the geographic region where squadron leadership thinks the most training value would be added as well as where they would like to see an increase in operations to aid in mobility development. AFRICOM was the theater that was viewed as having the most inherent pre-launch operational risk mainly due to lack of infrastructure and distance from US bases. Finally,

the experience level selected to command in a difficult environment centered on the instructor qualification, but all respondents cited future value in exposing as many pilots as possible to these difficult operating environments.

Summary

This chapter stepped through the REMIS sortie data from the AFRICOM theater of operations. It examined the countries in Africa where AMC had an operational mobility presence. It then analyzed the sortie, cargo and passenger demand by country. Once organized the country specific data was compared to two existing airfield that currently host channel operations Djibouti Amdouli (HDAM), and Diori Hamani (DRRN). Using these airfields as baseline additional airfields were assessed for viability of reoccurring lift. Of the airfields analyzed four had a similar cargo footprint Leopold Sendar Senghor International (GOOY), Amilcar Cabral International (GVAC), Hassan Djamous (FTTJ), and Nouakchott (GQNN). These airfields were then assessed to determine if they could accept recurring mobility lift. Finally survey data from AMC C-5 and C-17 squadron leadership was assessed to determine which geographic regions C-5 and C-17 aircrew were the most experienced operating within, and which regions possessed the greatest training value for future AMC operations and aircrew development.

V. Conclusions and Recommendations

Conclusions of Research

This research began with three broad factors; demand, airfield feasibility and training value added. The assessment of demand concluded that there is an adequate sortie and cargo demand signal to add three additional airfields for cargo support in the AFRICOM AOR to the AMC Channel Listing. The suggested airfields are Amilcar Cabral International (GVAC) in Cape Verde, Hassan Djamous (FTTJ) in Chad, and Nouakchott (GQNN) in Mauritania. Adding these airfields provides AFRICOM three additional locations to utilize AMC channel lift in lieu of SAAM or Contingency, or local contract requests. This would still require AFRICOM to generate the minimum volume of cargo, but the addition of these fields would increase the fields serviced from the ETAR – DRRN from six to nine, providing AFRICOM a 33% increase in locations accessed from this channel route.

The assessment of feasibility did not exclude Leopold Sendar Senghor International (GOOY), or any of the three air fields listed above from routine airlift support. The airfields assessed in the feasibility section of chapter four follow a similar model to the existing ETRA-DRRN channel, and have few if any diplomatic difficulties. Per the Foreign Clearance Guide the additional airfields had local fuel, cargo handling support, and offered RON capability if required/approved by AMC. Of the four airfields assessed, the C-17 was suitable for all and the C-5 was suitable on three of four.

When compared against the existing ETAR – DRRN channel the four airfields suggested were on average only 188 great circle miles further, with an average increase in flight time of 20.25 minutes. This relatively small additional time/distance does not

significantly drive up total flight cost nor would it add any duty day restrictions. Assuming all cargo demand requirements were met, mission cuts from ETAR to any of these fields would closely match that of an ETAR – DRRN route.

The first channel route from ETAR – DRNN was flown on December 8, 2013. As of April 8, 2014 it has flown five times moving a total of 78 pallet positions moving a total of 151 tons of cargo (Boynton, 2014). By adding GVAC, GQNN, and FTTJ to the list of locations supported you have three additional airfields who have accounted for 36 missions with twenty five or more STONS of cargo over the eighteen months studied. This additional cargo would allow for the creation of an additional channel route. The ETAR – DRRN channel would continue to service the locations in the AMC Channel Sequence listing with the exception of Senegal (GOOY). GOOY would be replaced with Ndjamena Hassan Djamous (FTTJ). Senegal (GOOY) would then be classified as a stand-alone APOD servicing Cape Verde (GVAC) and Mauritania (GQNN). With fewer servicing locations and a smaller cargo footprint this channel could be offered monthly in order to ensure adequate cargo demand requirements thus providing AFRICOM an additional cargo arrival location in western Africa increasing total AFRICOM channels by 25%.

This additional channel would not only increase AFRICOM's access to AMC lift, but it would also provide AMC squadrons an additional option to build crew experience in Africa. Channel operations offer AMC squadrons a unique option to view mission locations in advance and set a crew that would benefit most from this mission. This additional channel would give AMC squadrons additional access to mobility experience in Africa while providing airlift support to a COCOM.

Survey data from AMC C-5 and C-17 leadership did not support a desire for an increase in AFRICOM operations from a training perspective. Although squadron leaders cited their crews as inexperienced in this region, AFRICOM ranked third behind PACOM and SOUTHCOM in perceived benefit to mobility development. Squadron leadership thought operations in the AFRICOM AOR would add value to their crew force, but thought PACOM and SOUTHCOM would be a better fit in the face of policy shift and a potential reduction in flight hours available.

Significance of Research

This research presented an answer to the question "what are our options to maintain the currency of the mobility force, keep proficiency levels high enough to operate effectively in a global environment, and develop the next generation of AMC aircrew in a post Afghanistan environment." The past thirteen years of war have given the mobility force a vast amount of experience funded almost exclusively by TWCF missions. In coming years AMC has to seek out new options to provide aircrew global mobility experience within the constraints of a shrinking budget.

Recommendations for Action

Given the current tempo of operations and commitments in the CENTCOM AOR AMC cannot yet shift its gaze completely toward low cargo demand environments. However, if no actions are taken to prepare for a post war environment AMC and the Air Force risk losing the flying experience gained over the last thirteen years. Adding the aforementioned airfields to the AMC Channel Listing, and using their cargo demand to create an additional channel route from ETAR - GOOY creates a reoccurring airlift

opportunity for AMC squadrons to develop their aircrew within the AFRICOM AOR. Additionally this recommendation provides AFRICOM an additional reoccurring channel route increasing availability to AMC lift and the ability to potentially restructure some intra-theater cargo delivery plans.

Recommendations for Future Research

This research examined one potential region for additional mobility lift in a low demand environment, specifically the AFRICOM AOR. This model could be applied across other regions such as South America, or specific regions within the PACOM AOR to generate additional candidate lift locations. Once an additional location is established, the next step is to determine how best to integrate these airfields into the current mobility lift structure. This research focused on the channel lift structure due to its predictability.

An additional area to be explored is the potential for medical evacuation within the continent of Africa. As stated earlier AFRICOM has no assigned lift assets and therefore cannot provide this service organically. If an American presence in the region continues to expand it would be a logical next step to provide medical evacuation given the potential for injury coupled with the lack of medical facilities. If commitments in the CENTCOM AOR are reduced the Air Force will have the ability to leverage the medical evacuation lessons learned throughout the last two conflicts to a region that could greatly benefit from this service.

Finally as CENTCOM conflicts draw to a close we need to look at programs such as Air Transportation and Air to Air Refueling and other Exchange of Services (ATARES). This program allows for the exchange of mobility lift and air

refueling on a credit basis. Using AMC's large airlift and air refueling capacity to augment international partners would open opportunities for more robust aircrew training, as well as give US COCOMS the ability to leverage these ATARES credits for smaller scale lift provided by partner nations that may otherwise be cost prohibitive.

Summary

If operations in the CENTCOM scale back as predicted, adding these additional African locations to the AMC Channel Listing, and creating an additional channel route would provide more airlift options for AFRICOM, and therefore a larger footprint for TWCF funded missions to be used in lieu of O&M flight hours. This would lighten the Air Force's financial burden of solely funding mobility crew flight currency, proficiency, and development. However, AMC squadron leadership does not view this as the optimal location to push mobility assets and training. Therefore, to realize the training potential provided by this additional route structure these routes would have to qualify via normal channel means.

Appendix A

Table 8. REMIS Data for Botswana

Botswana			
FBSK: Sir Seretse Khama **FBTP:** Thebephat Shwa			
	Aggregate	**FBSK**	**FBTP**
Total Sorties	27	14	13
	Commercial Carrier	**C-17**	
Sorties by Aircraft type	8	19	
	Total(STONS)	**FBSK**	**FBTP**
Cargo	365	289.5	75.5
Cargo average/sortie	13.52	20.68	5.81
Sorties > 25 STONS	8	4	4
	Total	**FBSK**	FBTP
Passengers	9	1	8
Passenger average/sortie	0.33	0.07	0.62

Table 9. REMIS Data for Burkina Faso

Burkina Faso			
DFFD: Ouagadougou			
	Aggregate	**DFDD**	
Total Sorties	25	25	
	Commercial Carrier	**C-17**	
Sorties by Aircraft type	24	1	
	Total(STONS)		
Cargo	38.5		
Cargo average/sortie	1.54		
Sorties > 25 STONS	1		
	Total		
Passengers	33		
Passenger average/sortie	1.32		

Table 10. REMIS Data for Cameroon

Cameroon					
FKKD: Douala **FKKL:** Salak **FKKR:** Garoua **FKYS:** Yaounde Nsimalen					
	Aggregate	**FKKD**	**FKKR**	**FKYS**	
Total Sorties	18	6	2	10	
	Commercial Carrier	**C-17**			
Sorties by Aircraft type	10	8			
	Total(STONS)	**FKKD**	**FKKR**	**FKYS**	
Cargo	264.77	26.9	0	237.87	
Cargo average/Sortie	14.71	4.48	0.00	23.79	
Sorties > 25 STONS	4	0	0	4	
	Total	**FKKD**	**FKKR**	**FKYS**	
Passengers	55	19	12	24	
Passenger average/sortie	3.06	3.17	6	2.4	

Table 11. REMIS Data for Cape Verde

Cape Verde					
GVAC: Amilcar Cabral International					
	Aggregate	**GVAC**			
Total Sorties	30	30			
	Commercial Carrier	**C-17**	**C-5**	**C-130**	
Sorties by Aircraft type	3	25	1	1	
	Total(STONS)	**GVAC**			
Cargo	643.65	643.65			
Cargo average/Sortie	21.46	21.46			
Sorties > 25 STONS	12	12			
	Total	**GVAC**			
Passengers	5	5			
Passenger average/sortie	0.17	0.17			

Table 12. REMIS Data for Chad

Chad			
FTTJ: Ndjamena Hassan Djamous			
	Aggregate	**FTTJ**	
Total Sorties	36	36	
	Commercial Carrier	**C-17**	
Sorties by Aircraft type	16	20	
	Total(STONS)	**FTTJ**	
Cargo	597.44	597.44	
Cargo average/Sortie	16.60	16.60	
Sorties > 25 STONS	15	15	
	Total	**FTTJ**	
Passengers	120	120	
Passenger average/sortie	3.33	3.33	

Table 13. REMIS Data for Djibouti

Djibouti					
HDAM: Djibouti Amdouli					
	Aggregate	**HDAM**			
Total Sorties	616	616			
	Commercial Carrier	**C-17**	**C-5**	**C-21 / C-12**	**KC-10**
Sorties by Aircraft type	215	350	29	21	1
	Total(STONS)	**HDAM**			
Cargo	10304.502	10304.50			
Cargo average/Sortie	16.73	16.73			
Sorties > 25 STONS	168	168			
	Total	**HDAM**			
Passengers	8490	8490			
Passenger average/sortie	13.78	13.78			

Table 14. REMIS Data for Ethiopia

Ethiopia					
HAAB: Bole International **HAAM:** Arba Minch					
	Aggregate	**HAAB**	**HAAM**		
Total Sorties	124	86	38		
	Commercial Carrier	**C-17**	**C-12 / C-21**		
Sorties by Aircraft type	52	68	4		
	Total(STONS)	**HAAB**	**HAAM**		
Cargo	1085.82	760.07	310.85		
Cargo average/Sortie	8.76	8.84	8.18		
Sorties > 25 STONS	9	8	1		
	Total	**HAAB**	**HAAM**		
Passengers	549	340	184		
Passenger average/sortie	4.43	3.95	4.84		

Table 15. REMIS Data for Kenya

Kenya					
HKMO: Mombasa Moi International **HKJK:** Nairobi Jomo Kenyatta International **HKM1:**					
	Aggregate	**HKMO**	**HKJK**		
Total Sorties	39	19	20		
	Commercial Carrier	**C-17**	**C-40**	**C-12**	
Sorties by Aircraft type	9	27	2	1	
	Total(STONS)	**HKMO**	**HKJK**		
Cargo	778.20	448.84	253.17		
Cargo average/Sortie	19.95	23.62	12.66		
Sorties > 25 STONS	5	2	3		
	Total	**HKMO**	**HKJK**		
Passengers	465	262	35		
Passenger average/sortie	11.92	13.79	1.75		

Table 16. REMIS Data for Libya

Libya				
HLLT: Tripoli International **HLLM:** Mitiga International **HLLB:** Benina International				
	Aggregate	**HLLT**	**HLLM**	**HLLB**
Total Sorties	44	26	17	1
	Commercial Carrier	**C-17**		
Sorties by Aircraft type	24	20		
	Total(STONS)	**HLLT**	**HLLM**	**HLLB**
Cargo	441.87	198.67	243.20	0.00
Cargo average/Sortie	8.66	5.68	14.31	0.00
Sorties > 25 STONS	9	5	4	0
	Total	**HLLT**	**HLLM**	**HLLB**
Passengers	212.00	170.00	30.00	12.00
Passenger average/sortie	4.82	6.54	1.76	12.00

Table 17. REMIS Data for Mali

Mali				
GABS: Senou **GAMB:** Ambodedjo **GAGO:** Gao				
	Aggregate	**GABS**	**GAMB**	**GAGO**
Total Sorties	104	91	12	1
	Commercial Carrier	**C-17**	**C-130**	
Sorties by Aircraft type	24	56	24	
	Total(STONS)	**GABS**	**GAMB**	**GAGO**
Cargo	1295.07	1291.87	0	3.2
Cargo average/Sortie	12.45	14.20	0.00	3.20
Sorties > 25 STONS	30	30	0	0
	Total	**GABS**	**GAMB**	**GAGO**
Passengers	827	819	8	0
Passenger average/sortie	7.95	9.00	0.67	0.00

Table 18. REMIS Data for Mauritania

Mauritania					
GQNN: Nouakchott **GQNI:** Nema **GQNA:** Aioun El Atrouss					
	Aggregate	**GQNN**	**GQNI**	**GQNA**	
Total Sorties	28	25	2	1	
	Commercial Carrier	**C-17**	**C-130**		
Sorties by Aircraft type	6	21	1		
	Total(STONS)	**GQNN**	**GQNI**	**GQNA**	
Cargo	538.19	491.13	40.06	7	
Cargo average/Sortie	19.22	19.65	20.03	7.00	
Sorties > 25 STONS	9	9	0	0	
	Total	**GQNN**	**GQNI**	**GQNA**	
Passengers	227	167	60	0	
Passenger average/sortie	8.11	6.68	30.00	0	

Table 19. REMIS Data for Morocco

Morocco							
GMME: Rabat Sale International **GMAD:** Al Massira International **GMMX:** Menara **GMBG:** -- **GMAG:** -- **GMAA:** Inezgane							
	Aggregate	**GMME**	**GMAD**	**GMMX**	**GMBG**	**GMAG**	**GMAA**
Total Sorties	29	8	8	10	1	1	1
	Commercial Carrier	**C-17**					
Sorties by Aircraft type	16	13					
	Total(STONS)	**GMME**	**GMAD**	**GMMX**	**GMBG**	**GMAG**	**GMAA**
Cargo	469.49	155.12	0	254.02	0.00	60.35	0.00
Cargo average/Sortie	16.19	19.39	0.00	25.40	0.00	60.35	0.00
Sorties > 25 STONS	8	3	0	4	0	1	0
	Total	**GMME**	**GMAD**	**GMMX**	**GMBG**	**GMAG**	**GMAA**
Passengers	1466	18	1313	135	0	0	0
Passenger average/sortie	50.55	2.25	164.13	13.5	0	0	0

Table 20. REMIS Data for Niger

Niger				
DRRN: Diori Hamani **DRZF:** Diffa **DRZL:** Arlit				
	Aggregate	**DRRN**	**DRZF**	**DRZL**
Total Sorties	89	87	1	1
	Commercial Carrier	**C-17**	**C-5**	
Sorties by Aircraft type	30	58	1	
	Total(STONS)	**DRRN**	**DRZF**	**DRZL**
Cargo	1453.18	1434.98	0	18.2
Cargo average/Sortie	16.33	16.49	0	18.2
Sorties > 25 STONS	31	31	0	0
	Total	**DRRN**	**DRZF**	**DRZL**
Passengers	490	477	13	0
Passenger average/sortie	5.51	5.48	13.00	0

Table 21. REMIS Data for Senegal

Senegal				
GOOY: Leopold Sedar Senghor International				
	Aggregate	**GOOY**		
Total Sorties	76	76		
	Commercial Carrier	**C-17**		
Sorties by Aircraft type	14	62		
	Total(STONS)	**GOOY**		
Cargo	1013.43	1013.43		
Cargo average/Sortie	16.35	16.35		
Sorties > 25 STONS	22	22		
	Total	**GOOY**		
Passengers	195	195		
Passenger average/sortie	2.57	2.57		

Table 22. REMIS Data for South Africa

South Africa								
FAWK: Waterhloof AFB **FACT:** Capetown Int **FALA:** Lanseria **FAOR:** O R Tambo **FAJS:** Johannesburg **FALE:** King Shaka **FAOB:** Overberg								
	Aggregate	**FAWK**	**FACT**	**FALA**	**FAOR**	**FAJS**	**FALE**	**FAOB**
Total Sorties	90	32	28	19	8	1	1	1
	Commercial Carrier	**C-17**	**KC-10**					
Sorties by Aircraft type	7	80	2					
	Total(STONS)	**FAWK**	**FACT**	**FALA**	**FAOR**	**FAJS**	**FALE**	**FAOB**
Cargo	1127.04	590.54	233.58	302.92	0.00	0.00	0.00	0.00
Cargo average/Sortie	12.52	18.45	8.34	15.94	0.00	0.00	0.00	0.00
Sorties > 25 STONS	25	10	6	9	0	0	0	0
	Total	**FAWK**	**FACT**	**FALA**	**FAOR**	**FAJS**	**FALE**	**FAOB**
Passengers	66	0				10	0	0
Passenger average/sortie	0.73	0						

Table 23. REMIS Data for Tanzania

Tanzania				
HTDA: Dar ES Salaam **HTZA:** Zanzibar-Kisauni **HTKJ:** Kilimanjaro International				
	Aggregate	**HTDA**	**HTZA**	**HTJK**
Total Sorties	39	36	2	1
	Commercial Carrier	**C-17**	**C-5**	
Sorties by Aircraft type	8	30	1	
	Total(STONS)	**HTDA**	**HTZA**	**HTJK**
Cargo	353.74	315.37	0	38.37
Cargo average/Sortie	9.07	8.76	0.00	38.37
Sorties > 25 STONS	8	7	0	1
	Total	**HTDA**	**HTZA**	**HTJK**
Passengers	54	54	0	0
Passenger average/sortie	1.38	1.5	0.00	0

Table 24. REMIS Data for Uganda

Uganda			
HUEN: Entebbe International			
	Aggregate	**HUEN**	
Total Sorties	30	30	
	Commercial Carrier	**C-17**	**C-5**
Sorties by Aircraft type	13	16	1
	Total(STONS)	**HUEN**	
Cargo	481.57	481.57	
Cargo average/Sortie	16.05	16.05	
Sorties > 25 STONS	7	7	
	Total	**HUEN**	
Passengers	215	215	
Passenger average/sortie	7.17	7.17	

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14. ABSTRACT

This Graduate Research Project analyzed the feasibility of additional channel airlift in low cargo demand theaters specifically AFRICOM. Current operations in CENTCOM provide Air Mobility Command ample flight hours to develop and season its mobility force. With a drawdown in operations and removal of the majority of forces in Afghanistan AMC will have to find other areas to operate to ensure the global mobility proficiency. This paper evaluated the feasibility of using locations throughout Africa to provide AMC an option to train and develop its crew force, while providing airlift for a Geographic Combatant Command. This research analyzed the historic airlift demand in Africa. Airfields meeting channel demand requirements were then assessed for the viability of routine use. Finally, survey data from AMC C-5 and C-17squadron leadership were assessed to determine the desire for and potential training value added by operations in Africa. The results show there are additional locations in Africa that can support regular mobility lift, but AMC squadron leadership did not deem locations in Africa as optimal for future mobility development.

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